

B VS. H CURVES FOR 1008 AND 1020 STEELS

A. Ito, W. Bosworth, A. T. Visser, J. Grimson, and W. Yang

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For the purpose of investigating the saturation regions, we have measured the B vs. H curves for the purchased 1008 and 1020 steels. In order to make a fair representation, the sample was chosen under the following conditions.

- 1) It was taken far away from the flame cutting region.
- 2) 'A hand saw was used to cut off the sample.
- 3) Finally the sample was machined into a toroidal shape of about 2" OD, 1.75" ID and 1/2" height.

We fabricated two samples of each type of steel in order to check the consistency of the measurements. The results are shown in Figs. 1 to 8.

For comparison, we plotted the curves on USS steel 1010 and 1020 respectively. As shown in Figs. 9 and 10, the measured curves are similar to that of hot rolled types of steel.

For convenience of the interested readers who want to run LINDA, TRIM or POISSON programs, we listed the values of B and H then computed values of B^2 and Gamma as shown in Tables 1 and 2. The samples were measured by Arnold Engineering, Marengo, IL.

We appreciate the technical assistance by J. Robb and L. Tung.



Table 1 1008 Steel 7/1/83

В (Кg) Н		$B^{2}(x 10^{8})$	$H\left(\frac{Amp-Turn}{meter}, \times 10^2\right)$	$\gamma = \frac{1}{\mu} = \frac{H}{B} (x \cdot 10^{-4})$
0	-0.1	0	08	-
1.0	0.0	.01	0.00	_
1.5	0.1	.02	.08	.67
2	0.3	.04	. 24	1.5
3	0.5	.09	.400	1.67
4	0.8	.16	.64	2.
5	1.0	.25	.80	2.
6	1.4	.36	1.11	2.333
7	1.9	.49	1.51	2.714
8	2.4	.64	1.91	3.00
9	3.4	.81	2.71	3.778
10	4.2	1.00	3.34	4.200
11	5.5	1.21	4.38	5.000
12	7.3	1.44	5.81	6.083
13	9.5	1.69	7.56	7.308
14	13.5	1.96	10.74	9.643
15	24.3	2.25	19.34	16.2
16	45.0	2.56	35.81	28.125
17	74.0	2.89	58.89	49.412
18	127.0	3.24	101.06	70.56
19	205.0	3.61	163.13	107.895



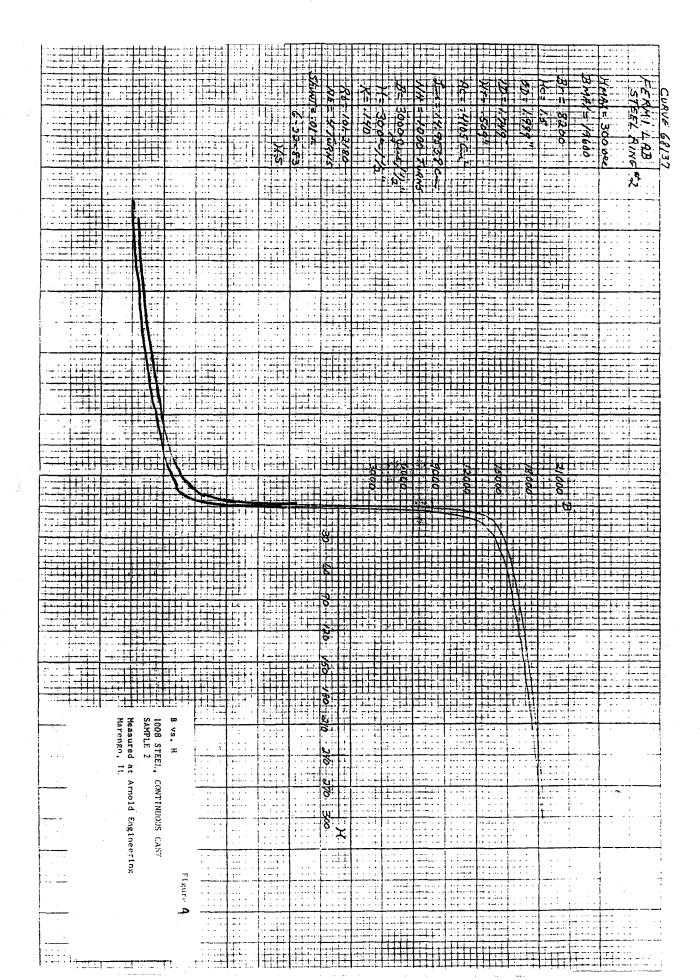
Table 2 1020 Steel 7/1/83

B (Kg)	H (oersted)	B ² (x 10 ⁸)	$H\left(\frac{Amp-Turn}{meter}, \times 10^2\right)$	$\gamma = \frac{1}{\mu} = \frac{H}{B} (x \cdot 10^{-1})$
0	0	0	0.00	-
0.5	0.1	.0025	.08	2.
1	0.2	.01	.16	2.
2	0.4	.04	.32	2.
3	0.6	.09	.48	2.
4	0.8	.16	.64	2.
5	1.1	.25	.88	2.2
6	1.5	.36	1.19	2.5
7	2.0	.49	1.59	2.857
8	2.6	.64	2.07	3.25
9	3.6	.81	2.86	4.00
10	4.6	1.00	3.66	4.6
11	6.2	1.21	4.93	5.636
12	8.2	1.44	6.53	6.833
13	11.5	1.69	9.15	8.846
14	17.0	1.96	13.53	12.143
15	28.8	2.25	22.92	19.2
16	47.0	2.56	37.40	29.375
17	86.0	2.89	68.44	50.588
18	138.0	3.24	109.82	76.667
19	215.0	3.61	171.09	113.158

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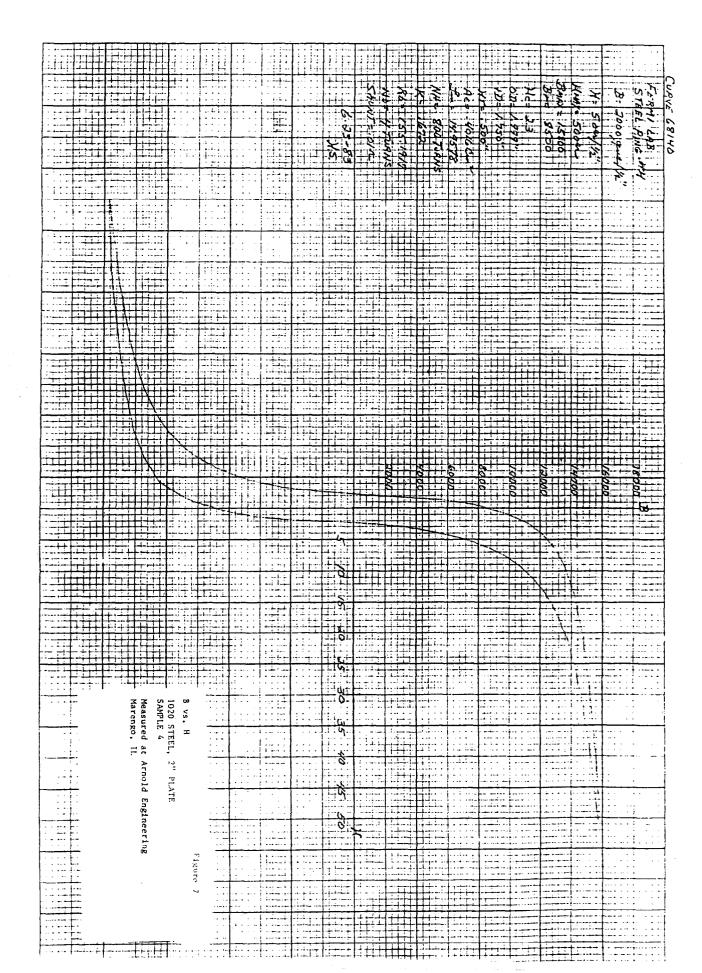
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